

## **CRI ECONOMICS TEAM RESPONSE TO WRITTEN COMMENTS ON NOV. 13TH DRAFT REPORT**

### **1. Pacific Northwest Project (Darryll Olsen)**

a. Too little time for review. The crowded time schedule was necessary to meet the requirements imposed by DOE.

b. Lack of consistency with NED analysis. The term “NED analysis” refers to a set of guidelines for evaluation of water resources projects published by the (defunct) US Water Resources Council. We have been consistent with those guidelines for the most part. There is one major deviation between our approach and the guidelines -- the report is focused on economic impacts in Washington State. For a variety of reasons, the National Economics Development benefits will not equal the Washington State economic benefits or impacts. For example, the increase in agricultural production value in Washington State would, in a national analysis, be balanced against reductions in values elsewhere stemming from competition in the agricultural product markets. To include the national viewpoint would require a much more extensive analysis than was called for in the scope of this study.

c. “Bifurcation” of the Columbia Basin Project from the other water rights. The report has focused on a comparison of five “management scenarios” provided by DOE, not on specific geographic sub-regions. But, based upon the tables presented in the report, one can easily pick out the effects of the CBP from other effects. We will make that even easier by including a summary table for the CBP project effects.

d. Differences between the CRI reported yield/acre in Benton County and those reported in the September 2000 US Army Corps of Engineers report “Salmon Recovery through John Day Reservoir, John Day Drawdown Phase I Study, Economics Analysis Technical Appendix Water Supply Section”. We have a partial response, but we intend to investigate this issue more before finalizing the report.

The yields per acre used in our study must be consistent with the scope of the water rights being considered. We have assumed that the distribution of new water rights under the CRI would follow the pattern of existing water rights applications, and these are grouped by county and pool. Consequently, we are using county-level acreage data for much of the analysis. The Corps of Engineers study does not do this. It focuses on just that portion of the agriculture sector that draws water from the John Day reservoir, and for most crops it reports almost identical yields and production values for Oregon and Washington sides of the pool. Also, the Washington data for apple yields was apparently obtained from at most a couple enterprises. Hence, we are not yet convinced that the Corps of Engineers report is a better source of information than the ones we have used. Further, the yield used in our analysis is larger than the one used in the Corps of Engineers report.

e. The report uses year 2000 prices, a year of low prices for potatoes, etc. We are shifting to year 2002 prices based on a current value average price for several years for the final report.

f. Lack of accountability for information in the enterprise budgets. There is room for disagreement on the financial projections from any set of studies, but, generally, the enterprise budgets developed by agricultural extension agents incorporate a range of experience and are based upon numerous direct field data collections. The raw data from such studies are not distributed publicly because that would release sensitive, proprietary information. However, the results of those enterprise budget studies are widely available, and we have provided the web addresses where they can be obtained. Further, it is beyond the scope of work to gather new data by interviewing growers. The study is to use existing data sources. As a result, the enterprise budgets may not represent the cost of production for any specific grower, but they are consistent with the region they are developed for. In this case, most were developed for the Columbia River Basin (not just the Columbia Basin Project). As such, the enterprise budgets used are representative of the study region as a whole.

g. The net value per acre-foot of water from our study (\$63) is lower than Pacific Northwest Project people project from a review of water and land value data. Our estimate is based upon Washington Agricultural Statistics Service (WASS) reports and the enterprise budgets discussed above. There are many reasons for these estimates to differ from a value inferred from land or water transactions. Land and water markets are not necessarily reliable indicators of average water or land values. This is because the markets are “thin” and the values represent a few exchanges that do not necessarily reflect the average conditions. Also, published studies of agricultural land values have consistently demonstrated an odd tendency for agricultural land prices to be far higher than would be expected based upon a standard financial analysis (net present value of expected net earnings). Hence, interpretation of land values as an indicator of expected net earning requires large amounts of transaction data and careful interpretation. An in-depth study of land values for the Washington State regions affected by the CRI was definitely not within the scope of this study. However, we will include a brief discussion of these techniques and the associated values that are available.

h. The review procedure for this report is unconventional and not collaborative. The review process included an opportunity for the members of the DOE-appointed Economics Advisory Committee to read and comment, and we are responding to that.

i. Investigators should meet with and review the enterprise budgets with CSRIA members in order to calibrate the results to real-world conditions. We have been seeking information where ever we can find it, and we would gladly consider verifiable information submitted by CSRIA members. Within the scope of the study, however, we are unable to run field studies of farm budget in each of the areas covered by the CRI as was discussed above. This would amount to constructing our own enterprise budgets for the agricultural sector, and that would be a major project in itself. So, as stated at the outset of this study, our aim is to use the best existing and available studies for all economic sectors affected by the CRI – hydropower, navigation, recreation, municipal and industrial water supply, flood control, and passive uses.

## 2. Columbia River Inter-Tribal Fish Commission (Olney Patt, Jr.)

a. Report fails to account for effects on fish, hence is pre-mature. Should be coordinated with NAS study.

True. Many others have echoed this comment.

b. Report deals with a narrow range of alternatives that does not include those which would enhance the Columbia river fish that are currently threatened and endangered. True. We are looking only at the 5 “Management scenarios” presented by Washington Department of Ecology.

c. Report fails to consider climate cycles and climate change which could make less water available during the summer irrigation season.

This is correct, and we have included more explanation below.

d. Additional water withdrawals will increase the impacts of power peaking in the hydro system, which harms juvenile salmon in the Hanford Reach, etc.

This is a possibility that we did not consider. We were assuming that the Vernita Bar agreement and related Bi-Op measures would take care of these problems. Maybe we’re wrong.

e. The report should consider higher fees to offset damage to salmon populations. This is a policy issue that was dealt with by DOE. The study team had a narrow focus on the “Management Scenarios” presented to us by DOE. The notion of higher fees to offset damages is an interesting one, but one which we are not prepared to evaluate with current information. We would need to assess this proposal in a major new effort.

f. Report doesn’t attempt to estimate economic loss to salmon and steelhead fishing, and these losses aren’t contained in the “passive use value”. We agree on both points. And this is consistent with the notion that we are awaiting the NAS report. I am sure that you will agree that a small group of economists is not the right venue for sorting out the complex and controversial issues associated with flow/temperature and other effects on salmon survival.

g. Report doesn’t consider the ceremonial, subsistence, cultural and socioeconomic values of salmon – values that are impossible to quantify. Should incorporate the Meyer Resources report (1999) in our study.

We agree that the study does not consider the non-quantifiable social effects of water diversion on salmon fishing. The extent of these effects will depend largely upon how greatly the new water diversions affect the fish runs and fishing conditions. As noted above, our report will have to be updated or augmented after the NAS committee resolves questions concerning these impacts. It is not clear how we would use the Meyer report to do this, as that report is focused on lower Snake River salmon. We’ll need to confer more on this.

h. Why is a 20-year window proposed for the life of the water withdrawals?

Actually, the water rights considered would be permanent (or, at least as permanent as such rights typically can be). The 20-year window was thought to be the period of time over which the new water rights would be allocated and implemented. This was simply a way to depict the

future process, but the actual details of how rapidly water rights would be issued, if the DOE decides to do so, is not known at present.

i. Report should graph the water withdrawals that have occurred over the past 80 years. We don't have this information at hand, but we did include a table showing the full extent of existing surface water diversion rights from the mainstem Columbia River in Washington. That helps to put the CRI proposal in perspective.

j. Why is "low risk" associated with Scenarios 1 and 2?

The intent here was to indicate how Department of Ecology was thinking about the decision process. The table is not displaying a judgment about what risk would be present as a result of implementing the scenarios; just the opposite. If the NAS committee concludes that there is little or no risk to salmon from new diversions of 1 MAF, then the Department would consider Scenario 1. If the NAS concludes that there is "high risk" then the department would consider only Scenario 5.

k. The report needs better data on irrigation efficiency and conveyance losses, and it should provided estimated error bounds. Also, the report should include water losses from evaporation or seepage from irrigation systems.

We were thinking that the most important information here is incorporated in the patterns of consumptive use (incorporation in crops and evaporation) versus "return flow" (water moving back to the river from seepage, groundwater movement, waste canals, etc.). That is, consumptive use is a direct deduction from water in the river and associated hydrologic system. Return flow is diverted water that continues as river flow (although on a different time schedule than natural flow). That is why we focused on those two aspects.

l. Hydropower losses ignore at The Dalles and Bonneville dams.

Actually, we did include power losses at these lower dams in Tables 5.1 through 5.3. Since others have also had difficulty understanding what we did here, we will have to make this clearer in the final draft. Basically, the cost per acre foot at each dam is calculated as a system loss – i.e. a loss at that dam and all subsequent dams downstream, as adjusted to reflect return flows. So, for example, the \$26.23/af loss listed for Grand Coulee in an average year accounts for reduced flow and hydropower production at Grand Coulee, Chief Joseph, the 5 PUD dams, and the four lower Columbia river dams caused by the diversion of 1 acre-foot to the Columbia Basin Project.

m. The study doesn't consider the effects of flood control operations and possible changes in dam operations to improve spring fish flows.

This is correct. We didn't look at the many interesting possibilities for altering the dam operations to benefit the salmon. That would be a useful additional study, but we could not fit it within the relatively narrow confines of this study.

n. Better climate and precipitation forecasts could improve operation of flood control reservoirs. We agree, but unfortunately that topic also did not fit within our scope of work. [On a related issue see Hamlet, Huppert, and Lettenmaier. 2002. Economic Value of Long-lead Streamflow

Forecasts for Columbia River Hydropower. Journal of Water Resources Planning and Management. 91-101]

o. Statement that refill occurs during April through August (Chap. 6) is incorrect. Yes, we agree and will correct that.

p. How much water is “wasted” when navigation locks are used.

We prefer to think of navigation as one of the several uses for water in the Columbia river. From this view, it is not “wasted” when used for lockage. The water going through locks is not comparable to the proposed 1 MAF diversion, because it remains in-river and is part of the overall flow.

q. The report does not consider the effects of climate cycles (El Nino/La Nina) or global warming trends on mainstem flows.

This is correct, we have not incorporated these in our analysis. There are a variety of global climate models, and the UW Climate Impacts Group (CIG) has considered these in the context of the Pacific Northwest region. Generally, the global warming trend is likely to result in higher temperatures and lower snowpack, which will change the timing of flows in the river. To maintain summer flows and irrigation withdrawals, we suspect that additional storage reservoirs would have to be built. Whether the overall precipitation will increase or decrease is less certain. It is not clear how we would incorporate this in the study of new diversions of 1 MAF or less.

### 3. Center for Environmental Law and Policy (Karen Allison)

#### a. Inadequate time for study and too narrow a scope of study.

This comment is widely shared by members of the EAC, and we working to provide constructive information within the shortcomings of a narrowly defined and quick study.

#### b. The appropriate questions are different from the ones investigated by the Study Team.

Yes, we would all agree that questions concerning benefits of healthy rivers and costs of further degradation are central to the study of environmental and resource economics. However, the incremental effects of additional withdrawals can reasonably be considered as a much narrower policy question. And that is what this report attempts to do. It is not clear to us that we have to study the broadest possible questions in order to make reasonable decisions on relatively minor changes in policy. Still, we understand that reasonable people will differ on when the policy at issue is small versus when it has wide implications.

#### c. The study assumes that paper rights are fully used (water is diverted = water right amount).

Yes, this is the procedure we have been following. We will check with the BOR report that you referenced and with DOE to find out whether we can make some reasonable adjustments to incorporate partial use of water rights.

#### d. The study incorrectly assumes that 15 – 25% of divert water returns to the river.

We have derived the return flow amounts from studies that compile large amounts of data to estimate return flows. There is substantial basis for these estimates. See Bonneville Power Administration. 1993a. Modified Streamflows 1990 Level Irrigation, Columbia River and Coastal Basins 1928-1989. Portland, OR 279 p. For example, we assume ~ 24% return flow from the Columbia Basin project, where the waste canals and the flows are clearly identified in existing documents. In the case of high pressure pump systems feeding drip irrigation, the return flows are more like 5%.

#### e. The report assumes that new irrigation water results in proportionate increase in irrigated acres.

Yes, that is our procedure. It is also true that some of the new surface water diversions, if allowed, would be used to substitute for groundwater pumping in areas where over-drafting of aquifers is currently happening. This is apparently the case in the Odessa area, which might get additional water from the Columbia Basin Project. About 30,000 acres of current land could be shifted to surface water. To assess the impact of the new water, we can reasonably assume that the overdraft practice cannot continue, and that that irrigated land would phase out of production without the new surface water. If this is accurate, then the new water has the effect of adding 30,000 acres of land to the continuing irrigable farmland, even though the actual irrigated land involved is not “new”. Our focus is on a “with -- without” comparison. How many more acres would be irrigated in the future if the new water is allocated? And the answer in this case would be 30,000 acres that would otherwise return to dry land farming or be fallowed.

#### f. Report incorrectly assumes that \$30 per AF/yr would be paid for water rights converted from interruptible to non-interruptible.

We re-read the set of scenarios provided to us by DOE, and under scenario 4 it reads "Fee: all new and converted pay \$30/AF annually". Maybe there is some confusion based upon different versions of these scenarios being circulated.

g. Amount of interruptible rights differs from other information provided to CELP by DOE, and the study assumes no legal or administrative costs.

The numbers reported in our original Table 2.3 were wrong. We re-checked the original data source and found that the total interruptible rights were as follows: ~ 122 AF surface water rights and 50 AF groundwater rights. Is this consistent with the information you have on hand?

The amount of interruptible and non-interruptible surface rights from the Columbia River that the study team is using came directly from DOE personnel. It is possible that different amounts of rights would be reported for different definitions of the study region. We are using a compilation of existing rights and applications for surface and groundwater rights within 1 mile of the Columbia river. The surface rights are converted to acre-feet equivalent by multiplying the permitted cfs times 1.98 (af per day per cfs) times 162.5 days (for 6 months of irrigation). These are obviously estimates rather than actual measurements of water usage.

h. The report assumes the Federal Columbia River system of dams will continue to operate in the face of drought and global warming.

Our analysis does not deal with the implications of global warming, although we are aware of long term predictions of consequence for the Pacific Northwest. The main effects of global warming will occur outside of our 20-year window. Still, the commenter has a good point, especially with regard to the need for additional dam storage capacity to sustain the existing system of water supply, navigation, and flood control.

4. Response to comments from the Confederated Tribes of the Umatilla Indian Reservation (D. Sampson, Executive Director)

a. The proposal to issue new non-interruptible water rights is illegal because it would impair 330 senior interruptible water rights holders.

The study team is not evaluating the legal issues, but we will advise the Department of Ecology of this concern.

b. The management scenarios should include a fee that equals the net value of agricultural land, somewhere in the range of \$56 – 114/acre.

We assume that the commenter means to convert value per acre of land into a value per acre-foot of water diverted. The fee per acre-foot consistent with these land values would depend upon water diversions per acre of land which varies with crop type, soil type, weather conditions, and irrigation efficiency. For example, with 75% water efficiency and a water consumption rate of 3 AF per acre of crop, each acre of land would need to divert 4 AF of water. The land value per AF of water would then be in the range of \$14 – 28.5. The range of water fees that were considered in the study is \$10 – 30 per AF, which overlaps the “guess-timated” value per AF range based upon land value. So, we are basically doing what we think you are suggesting.

c. Report conflicts with water quality standards.

This seems to be an overstatement. The report doesn’t conflict with the standards, the practice of diverting an additional 1 MAF might conflict with water temperature standards. Again, this is a regulatory issue for DOE rather than an economic issue for this report.

d. The report should use the amount of out-of-stream use provided in an attached report by Earl Weber.

Unfortunately, the report by Earl Weber that was attached to your message did not contain information about diversions. We would like to see those tables.

The amount of interruptible and non-interruptible surface rights from the Columbia river that the study team is using came directly from DOE personnel. In our final report, the amounts are reported as ~ 122 KAF for interruptible surface water rights and ~50 KAF of groundwater rights within 1 mile of the river. It is possible that different amounts of rights would be reported for different definitions of the study region. The surface rights are converted to acre-feet equivalent by multiplying the permitted cfs times 1.98 (af per day per cfs) times 162.5 days (for 6 months of irrigation). These are obviously estimates rather than actual measurements of water usage.

e. Use of out-dated 1987 agricultural data, questionable input-output modeling, and assumptions about increasing agricultural production.

We aren’t using out-dated 1987 agricultural data. Our report indicates the input-output model coefficients were from a 1987 model, but have been updated by Bill Beyers to better represent today’s technology in farming. Further, trends in agricultural production were carefully reviewed and considered in allocating new water to crops (see appendix B of the draft report).



f. Several studies illustrate the public's preferences and willingness-to-pay for un-irrigated, undeveloped, open space land. And "hydrating currently un-hydrated" land will severely impact the state's ability to biologically replenish itself.

It is hard to respond to these sweeping conclusions without seeing the analysis and references that back them up. Certainly, there have been studies of public value for open space and undeveloped land. Generally, these kinds of value are very sensitive to location and condition of the land. We haven't seen any such studies that would be pertinent to the dry lands that would likely be brought into production with new water, but we would be happy to include any published results on this that the CTUIR could provide.

g. Report assumes 100% return from M&I diversions and around 15-25% for irrigation return flow.

Actually, a major report by BPA concludes that M&I diversions return about 95% of the water, and we rounded this off to 100% to simplify the analysis. We could change it back to 95% but it would make no noticeable difference to the conclusions.

Return flows from irrigated agriculture vary all over the board, depending upon the nature of the transport losses and irrigation efficiencies. There are some systems (Methot Valley Irrigation District comes to mind) that use old dirt canals which lose up to 50% of the water diverted, and this water mostly percolates into the aquifer and returns to the river (actually increases the low flow of the Twisp river in late Fall). And there are systems like those used by high-tech, high-pressure pumped systems out of the John Day reservoir that reportedly return only 5% of the diverted water to the river. The assumed return flows that we used for the Columbia river diversion are derived from (as noted in the report) Bonneville Power Administration. 1993a. Modified Streamflows 1990 Level Irrigation, Columbia River and Coastal Basins 1928-1989. Portland, OR. The Columbia Basin Project, for example, returns about 21% of the water diverted, but this water returns to Wanapum, Priest Rapids, and McNary pools.

h. Report covers a 20 year period. Why?

This period does not represent the period of time covered by the report. The period was selected to represent a period of time over which the potential 1 MAF of new diversionary rights might be perfected and implemented. This was a planning device by DOE, not a prediction or a scientific assessment. The report is taking the tack of estimating the annual impacts once the water rights have been fully implemented.

i. The report should include an assessment of how the new diversion would impact fish and fishing.

The extent of these effects will depend largely upon how greatly the new water diversions affect the fish runs and fishing conditions. I am sure that you will agree that a small group of economists is not the right venue for sorting out the complex and controversial issues associated with flow/temperature and other effects on salmon survival. Our report will have to be updated or augmented after the NAS committee resolves questions concerning these impacts.

j. Report doesn't discuss rights and tribal values related to river flows and resources.

We would like to incorporate information that CTUIR has to offer on this, if it pertains to the effects of the increased water diversions envisioned in the CRI.

k. The Report fails to consider other state's water users and impacts on other states.

This is correct. The study was focused on the impacts within the State of Washington. There may be repercussions elsewhere that should be considered in a broader decision making framework.

l. Report fails to discuss impacts of global warming.

This is correct; we have not incorporated global warming in our analysis. There are a variety of global climate models, and the UW Climate Impacts Group (CIG) has considered these in the context of the Pacific Northwest region. Generally, the global warming trend is likely to result in higher temperatures and lower snowpack, which will change the timing of flows in the river. To maintain summer flows and irrigation withdrawals, we suspect that additional storage reservoirs would have to be built. Whether the overall precipitation will increase or decrease is less certain. It is not clear how we would incorporate this in the study of new diversions of 1 MAF or less.

m. The report overly relies on the assumption that replacement water will be available for purchase even in a drought year.

It is unclear how this assumption enters into the analysis.

n. The management scenarios in the report are not consistent with those provided to the NAS.

We have used the management scenarios as given to us by the Department of Ecology.

**5. Response to comments from Norman Whittlesey, Department of Agricultural and Resource Economics, Washington State University. Pullman, Washington. (via Masonis)**

a. A cost-benefit study of this sort should always be done in a 'with' vs 'without' framework. The status quo is considered to represent the 'without' scenario. Much of this is discussed in Appendix B to the report.

b. It is important to understand, however, that the acreage of these high value crops is not now constrained by available irrigable land. They are, instead, constrained by the markets for the end products (fresh and processed fruits and vegetables). Even if the newly developed lands have a high proportion of high value crops as assumed in the study, it must be recognized that each acre of such crops on the new land will merely replace another acre on existing land somewhere else in the state.

This comment was received too late in the process to be incorporated in any deep into the analysis. The study team recognizes that Washington State is a leading producer for a number of these high value crops and as a result, any significant increase in acreage could affect market price. A discussion is added to the first section to address this point.

c. Large scale new development will have to be based on three things: available water, available irrigable land, and the economic feasibility of new irrigation development. This study gives no consideration to the costs of new irrigation development or who might be willing to pay for them.

The bulk of this water would go to private irrigators that will pay for the full accounting cost of development and under some scenarios pay for some portion of mitigation. The analysis assumes water will be available up to the amounts stipulated and acreage is assumed to be available as well. Development of an economic optimization model and the county or small region data necessary to truly get at these issues is beyond the scope and time frame of the analysis.

d. Most of the potential new irrigation development in this state will require relatively high pump lifts to get water to the land. I don't believe that the study considered the costs of water delivery to new lands around the state.

Capital costs of irrigation equipment were included; however, capital costs for new or expanded pumping equipment were not included. As the scope of work called for using off-the-shelf data, the study team decided to develop average cost and revenue figures. While this ignored higher water costs in the high lift pump areas, it also ignored lower water costs in other areas.

e. The study included secondary impacts of new irrigation development. There were two errors in this case. The first was to use the economic net returns from the assumed crop mix on new lands. As explained in item 1 above, the direct net returns to the state should be based on the marginal crops that will actually be added by new irrigation. That is, the lower valued crops. The second error, in my judgment, is to present the gross values of income, employment, and value added as if they are 'net' gains to the state. In fact, the net change in these values, particularly for value added, is going to be much less (probably in the range of 10% to 20% of the gross values). Secondary impact values of this sort are generally not understood by the lay community, especially politicians, and result in a lot of misunderstanding and misuse. They

deserve a more honest presentation and more explanation of what they mean to the state economy.

See response to item b. for first comment.

f. The BMPs applied in the study are largely a smoke screen in my opinion. There will be no new irrigation development based on private capital investment that does not use the latest, appropriate, and efficient technology available.

BMPs play two roles in the analysis. First, it is assumed that all new water rights will use new irrigation technologies. Second, in scenarios 2 and 3 a majority (which Ecology defines as 80-percent) of existing water users will be required to be using BMPs for the full 1 MAF to be allocated. This implies that much existing acreage will need to upgrade their irrigation capital. This would come at a significant cost and could result in the full 1 MAF not being allocated.

g. There were assumptions about fees (\$10 to \$30 per acre foot) for water in some of the study scenarios. A quick review of the results did not reveal to me how these fees were used in the calculations of net farm income or where they played a role in the secondary impact analysis. These fees are included in the calculation of net revenues per acre and per acre-foot for scenarios 2 and 3. Text was added to clarify this.